which technical and scientific education is provided. During the year covered by the report, the Board has continued its policy of attempting primarily to coordinate and develop the provision for technical education made by the various public institutions of the metropolis. In the secondary schools the Board's regulations have lead to a great increase in the number of teachers of science and of domestic economy, while facilities for teaching practical chemistry and practical physics have been provided in the majority of boys' schools, some of which possess first-class physical laboratories and workshops. At the same time, the School Board has done much to equip its upper standard schools with laboratories and appliances for the practical teaching of science. To the polytechnics and the established schools of art, and to many secondary schools, the Board has made annual or maintenance grants. Provision has also been made in two polytechnics for courses of practical work for elementary teachers, and special classes of somewhat similar type have been provided at the cost of the Board in connection with University College, King's College, and Bedford College. Day classes in particular branches of science and technology are, in addition, conducted at some of the polytechnics. The Board contemplates making provision for developing commercial education, and is considering how to advance the interests of electro-chemistry, electro-metallurgy, and other subjects. The "Monotechnic" schools for particular subjects are also engaging its serious attention. When the Board commenced its work in 1893, there were only six polytechnics at work in London; there are now eleven. Last year the Board contributed a sum of 28,129*l.* to these institutions. During the year a total of 117,744*l.* 12*s.* 11*d.* was expended by the Board, leaving a balance in hand of 41,144*l* 14*s.* The aggregate expenditure and liabilities for the year ended March 31, 1898, may be stated in round figures to be 150,000*l.*, but this amount cannot be precisely estimated until all the claims for attendance grants are received. The Board estimates that during the year 1898–99 170,000*l.* will be required for the Council to meet the increased expenditure (possibly amounting to 184,175*l.*) necessitated by the development of the work of the Board.

THE Chancellor, Lord Herschell, presided over the annual celebration of the University of London, at the presentation of degrees last week. After congratulating the winners of distinctions he referred to the University of London Bill in the following words:—They were all aware that the Government had introduced a Bill which was to effect a reorganisation of the University, and that Bill had already passed one of the Houses of Parliament. The Government had announced their intention to bring the subject to a discussion and, if possible, to a solution in the House of Commons. On this question there were certain facts which were beyond dispute which it was necessary that they should take into account in estimating the situation as it stood to-day. In the first place there was a very strong public opinion—he might say conviction—that the University work of London needed some fresh organisation. There was also, he believed, a preponderating public opinion that those needs should be supplied, not by the creation side by side of the existing University of another University in London, but by the organisation of that existing University. But when they got beyond this they came no doubt into the region of controversy. There was, however, a further proposition about which they might be quite agreed, and that was this. If there was some further University provision to be made in London, and if it was to be accomplished by the reorganisation of the University of London, it would be utterly impossible to frame any scheme or to produce any solution of the question which would satisfy everybody. There were two points on which there seemed to be some misapprehension. He referred first to the position taken by some that the existing charter gave to the graduates a right which would be infringed if any measure were passed dealing with the University or its reorganisation except with their sanction and consent. That view he held to be quite erroneous. It was quite true that in the existing charter a provision was to be found that no new charter could be applied for by the Senate if Convocation vetoed the proceedings. It was, however, to be observed that the right was given by the charter to Convocation and not to the graduates otherwise than by or through Convocation. The Senate remained the executive of the University, and it was from the Senate that the petition for a new charter must come. Thus it was merely a domestic provision regulating the rights of the Senate and Convocation as between themselves. But since the charter was granted a most important change had taken place. Parliament was not content that the Government of the day should have power to advise Her Majesty to grant a charter to a new University or a new charter to the old University, and consequently every new charter had to be placed upon the table of Parliament; and Parliament had a distinct right of intervention with reference to the grant or refusal of a new charter. It was, therefore, a false attitude to say that the members of that University were in a position to dictate to Parliament what change should take place when it had come to the conclusion that some change was necessary in the public interest. It was Parliament alone which could finally determine such a question.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 12.—"A Study of the Phyto-Plankton of the Atlantic." By George Murray, F.R.S., Keeper of Botany, British Museum, and V. H. Blackman, B.A., F.L.S., Hutchinson Student, St. John's College, Cambridge, and Assistant, Department of Botany, British Museum.

The authors record their observations on a year's work in collecting phyto-plankton along a track from the Channel to Panama carried out by Captains Milner and Rudge, and also during one voyage to Brazil by Captain Tindall. They also give the results of their own observations on living material at sea. The material was obtained by the pumping method.

One of the objects of their work was to determine, if possible, the nature of the Coccospheres and Rhabdospheres. They describe the minute structure of the calcareous plates or coccoliths and rhabdoliths, and record the existence in the Coccospheres of a single central green chromatophore, separating into two on the division of the cell. They regard Coccosphæraceæ as a group of Unicellular Algæ, and they define the group, the limits of the genera and species. The Coccospheres and Rhabdospheres from the surface are compared with those of the deep-sea deposits and their identity established. They are also compared with geological coccoliths and rhabdoliths from various beds, and many objects regarded by geologists as true coccoliths and rhabdoliths are rejected. A large number of new Peridiniaceæ were discovered and are formally described and figured. No specific diagnoses of marine Peridiniaceæ have previously been published, authors of species having depended on figures, and, at most, a few words of description. It is hoped that the present systematic treatment of the subject will conduce to greater order in the group. The authors record the occurrence of all the forms in seven tabular statements, one for each collecting voyage.

Observations of the diatoms and Cyanophyceæ are also made, and are briefly treated.

A study was also made of the species of Pyrocystis, of which they describe a new one. The facts they record tend, in their opinion, to confirm the view originally expressed of it by Dr. John Murray, its describer, that it is an unicellular alga, doubts having been entertained of the accuracy of this opinion by several biologists.

Zoological Society, May 3.—Prof. Howes, F.R.S., in the chair.—Sir Harry Johnston, K.C.B., made remarks on the larger mammals of Tunisia, and selected for special mention the lion, leopard, cheetah, wild cat, Caracal lynx, hyæna, jackal, Fennec and common foxes, genet, ichneumon, porcupine, Barbary wild sheep, Addax antelope, hartebeest, and three gazelles. He mentioned the possibility of the leucoryx penetrating into Southern Tunisia, and noted the importation into Tunis from Morocco of a baboon (*Cynocephalus hamadryas?*), which was brought there by natives of Morocco. He also commented on the representations of the African elephant as a Tunisian animal in the Roman mosaics.—A communication was read from Prof. Robert Collett containing descriptions of three species of pigeons and two species of parrots from Northern Australia, of which the following were characterised as new: *Petrophassa rufipennis*, *Ptilopus* (*Leucotreron*) *alligator*, and *Psephotus dissimilis*.—A communication was read from Mr. W. T. Blanford, F.R.S., stating his reasons for regarding *Lepus oiostolus* Hodgs. and *L. pallipes* Hodgs. as identical, suggesting that the hare identified with *L. oiostolus* by Büchner was *L. hypsileius* Blanford, and showing that *Macacus rhesus villosus* True was identical with *M. assamensis* McClelland.—A communication was read from Dr. F. A. Dixey, Mr. Malcolm Burr, and the Rev. O. Pickard Cambridge, F.R.S., on the insects and arachnida collected in Socotra by Mr. E. N. Bennett, who had visited that island in 1896 and 1897 in company with the late Mr. Theodore Bent. It was pointed out that though the Socotran lepidoptera showed, as might have been expected, strongly marked African affinities, some of them, by their relation to forms belonging to West Africa and South Africa and the Mascarene group, suggested the conclusion that remains of a more primitive fauna still survived in Socotra.—A communication was read from Miss E. M. Sharpe on a collection of lepidoptera from San Domingo. This was accompanied by field-notes by the collector, Dr. Cuthbert Christy. Ninety-one species were enumerated, of which one—*Telegonus christyi*—was described as new.—A second communication from Miss Sharpe contained a list of lepidoptera lately collected by Mrs. Lort Phillips in Somaliland. Two new species of *Lycænidæ* were described, viz. *Tarucus louisæ* and *Spindasis waggæ*.

Geological Society, May 4.—W. Whitaker, F.R.S., President, in the chair.—The carboniferous limestone of the country around Llandudno, by G. H. Morton. At Llandudno the precipitous Great Orme's Head presents fine sections of the carboniferous limestone and its subdivisions referred to, and may be easily examined in a continuous series of cliffs, ridges, and quarries. The entire succession is, however, not perfect, for the highest beds of the "Upper Grey Limestone" have been denuded, and at the Little Orme's Head the subdivision is altogether absent. Copper-lodes on the Great Orme's Head appear to have been worked by the Romans, and again in recent years until abandoned fully thirty years ago. Some of the lodes are faults, but little can be ascertained about them now, and only two or three are faults with any appreciable amount of dislocation. It is to the undulation of the limestone that the ever-varying dip of the beds is attributed. Numerous fossils occur in the "Upper Grey Limestone," and a few are peculiar to the subdivision and the locality, but of these only a single specimen of each has been found.—The dolomitisation of the carboniferous limestone is remarkable, and almost peculiar to that around Llandudno, though it also occurs at Penmon in Anglesey. The "Lower Brown Limestone" has been almost entirely converted into dolomite, and portions of the overlying subdivisions. The filling of the faults has often been changed into dolomite, and the alteration of the limestone has generally been very capricious: the author's opinion being that the change took place after the dislocation of the strata in post-Triassic times.—The graptolite-fauna of the Skiddaw Slates, by Miss G. L. Elles. This paper deals, not only with the collections of the author, but with the Dover Collection and others preserved in the Woodwardian Museum, with the collections of Prof. H. A. Nicholson, Mr. Postlethwaite, and that of the Keswick Museum of Natural History. An account of the literature, both stratigraphical and palæontological, of the Skiddaw Slates is given, followed by a list of all the graptolites known from the beds. This list comprises twenty-two genera and fifty-nine species.

Entomological Society, May 4.—Mr. G. H. Verrall, Vice-President, in the chair.—Colonel Yerbury exhibited a series of Diptera collected at Hyères during March and April 1898, and including *Brachypalpus valgus*, Panz., *Callicera fagesii*, Guér., and a species of *Platystoma* which appeared to be undescribed.—Mr. Barrett showed aberrant forms of British species of Lepidoptera from Gloucestershire and Warwickshire.—Mr. Waterhouse exhibited two burnished golden beetles, *Anoplognathus aureus* from Queensland, and *Plusiotis resplendens* from Panama, which he stated to be interesting examples of a similar result being attained by a process of natural selection in two species of the same family in widely separated localities. Many members of the family had a slight tendency to show metallic colours. It would be interesting to ascertain whether there were any similarity in their surroundings in the two countries which would make this golden appearance an advantage, or whether it might be considered a "warning colour." Allied species, however, appeared to be edible.—Mr. Walker exhibited specimens of the rare *Philonthus fuscus*, Grav., found in a *Cossus*-eaten poplar in Chatham Dockyard at the end of April.—Mr. R. McLachlan communicated a paper on "Neuroptera-Planipennia belonging to the families Osmylidæ, Hemerobiidæ and Chrysopidæ, taken by the Rev. A. E. Eaton in Algeria."

PARIS.

Academy of Sciences, May 9.—M. Wolf in the chair.—Method for detecting and estimating small amounts of carbon monoxide in air in presence of traces of hydrocarbons, by M. Armand Gautier. The method described in previous papers on the same subject at 60° C. (the action of carbon monoxide upon iodic anhydrides) is here further developed. It is shown that the iodine set free can be determined with great exactness by passing the gases over copper at 100° C.; the loss of weight of the iodic anhydride, and the amounts of carbon dioxide and water produced can also be accurately estimated. Test analyses of known gas mixtures containing 1 part per 1000, and 1 part per 10,000 respectively, gave very satisfactory results: samples of Paris air taken at different times gave from 0·0 to 0·9 parts CO per million, while the air of the laboratory contained as much as 12·3 parts per million.—On the losses of ammonia which accompany the manufacture of farm manure, by M. P. P. Déherain. The results of the experiments are given in the form of three rules to be followed by the farmer, the chief point being that in presence of an excess of carbonic acid the losses of ammonia are much reduced.—Researches on the progressive development of the grape, by MM. Aimé Girard and Lindet. A series of proximate analyses of the pulp, skins and stones of the grape at various stages in its development.—The modifications undergone by strips of skin in autoplastic grafting, and the conditions which favour their growth in area, by M. Ollier.—On a mode of obtaining cultures and homogeneous emulsions of the human tuberculosis bacillus in a liquid medium, and on a mobile variety of this bacillus, by M. S. Arloing. Minute details are given of the methods of preparing homogeneous liquid cultures and emulsions of the tubercle bacillus. The immobility of this bacillus is not absolutely characteristic, as has hitherto been supposed.—Simple explanation of some celestial phenomena by the kathode rays, by M. H. Deslandres. A recognition of priority of M. Goldstein in his work on kathode rays, and a discussion of the application of this to the solar chromosphere and comets.—On the magnification of the discs of the sun and moon on the horizon, by M. D. Éginitis. The observations of the author show that none of the suggestions hitherto put forward to explain the increase in size of the sun and moon when low down in the horizon are sufficient. They may contribute to the phenomenon to a small extent, but the principal cause is still unknown.—On the explicit determination of differential equations of the second order at fixed critical points, by M. Paul Painlevé.—On the general theory of the characteristics of partial differential equations, by M. E. Goursat.—On total differential equations, by M. Alf. Guldberg.—On the evaporation of iron at the ordinary temperature, by M. H. Pellat. The effect previously shown to be produced upon a sensitised plate is shown to be due to a vapour given off by the iron, and not to any radiations of the nature of uranium rays.—On the kathode rays, by M. P. Villard.—Strengthening the X-rays, by M. Virgilio Machado. The tubular portion of the bulb is wrapped round with metal foil, or with an insulated spiral of copper wire.—The effect of diffusion in developing-baths, by M. Adrien Guébhard.—On the limits of inflammability of carbon monoxide, by MM. H. Le Chatelier and Boudouard. Under ordinary conditions gas mixtures containing between 16 and 75 per cent. of carbonic oxide are inflammable. The effects of the size of tube, temperature, and pressure of gas were also studied.—On a boro-carbide of beryllium, by M. P. Lebeau. The substance $C_4B_6Be_6$ is produced by heating an intimate mixture of glucina and boron in a carbon boat at the temperature of the electric furnace.—On some halogen salts of lead, by M. V. Thomas. Treatment with nitrogen peroxide distinguishes between mixtures of lead chloride and iodide, and a true chloro-iodide, only the latter giving the corresponding oxychlorides.—Note on the micro-structure of the alloys of iron and nickel, by M. F. Osmond. The study of the micro-structure of these alloys confirms the classification into three groups based upon their mechanical properties.—Thermal data relating to ethyl-malonic acid. Comparison with its isomers glutaric and methyl-succinic acids, by M. G. Massol.—Formation of furfurol by cellulose and some of its derivatives, by M. Léo Vignon.—Preliminary note on the geographical distribution and evolution of the *Peripatæ*, by M. E. L. Bouvier. The specimens studied were collected in Africa by the late M. Thollon, in whose memory the one new species is named *Peripatus Tholloni*. This species is intermediate between the American forms and those of the Cape.—On the organisation of the *Pleurotomariæ*, by MM. E. L.

Bouvier and H. Fischer.—On the structure and evolution of the protoplasm of the Mucorinaceæ, by M. L. Matruchot. -On the resistance of seeds to immersion in water, by M. Henri Coupin. Seeds differ greatly in their resistance to water, some living about the same time whether the water be renewed or not, others dying much sooner in the latter case.—Contributions to the knowledge of volcanic rocks in the French Alps, by MM. W. Kilian and P. Termier.—On a quaternary tufa recognised at Montigny, near Vernon, by M. Gustave F. Dollfus.—On the landslip of Saint-Pierre de-Livron, and the infiltration of layers of tufa, by M. E. A. Martel.—Embryological notes on the migration of spinal ganglia, by M. A. Cannieu.—Contribution to the study of the albumenoid materials contained in cereal and leguminous flours, by M. E Fleurent.—On the periods of treatment of black rot in the south-east of France.—A local magnetic pole in Europe, note by M. Mascart. M. Leist, of Moscow, has discovered at Kotchétovka, a village in the province of Koursk, a local magnetic pole where the magnetic needle stands vertically. A distance of 20 metres from this spot suffices to change the angle of dip by 1°.—Earthquake of May 6, 1898, communicated by M. Lœwy.

ST. LOUIS.

Academy of Science, April 18.—Mr. Carl Kinsley read a paper on series dynamo electric machines. He showed, by the results of tests of machines, that the relations between electromotive force, current, and speed can be represented by a surface. This is easily done, since for widely different currents, and for both dynamos and motors, the total induced electromotive force is strictly proportional to the speed when the current is constant. He stated that Frölich's empirical equation can be used to represent large portions of this surface, as suggested by Prof. F. E. Nipher. It was stated that the way in which a series motor will operate from a series generator can be predetermined; and, for cases reported, it was shown that computed results, throughout the complete range of working conditions, gave an average agreement with observed results to within 0·05 per cent. The method explained in the paper enables an engineer to design such a power transmission circuit accurately from shop tests of the machinery, and to operate the series motor at constant speed under all loads. It was shown that the resistance of the generator does not vary with the speed. This makes it possible to use a small series generator as a speed indicator, and so obtain instantaneous values of engine speeds from the voltmeter or ammeter readings, if the resistance of the outside circuit is kept constant. The practicability of this method of determining engine speeds was fully shown by the results reported in the paper.—Prof. J. H. Kinealy made some informal remarks on the ventilation of schools, and by means of a number of stereopticon views showed the different methods adopted for supplying the air required to the different rooms of schoolhouses.

DIARY OF SOCIETIES.

THURSDAY, May 19.

Royal Institution, at 3.—Heat: Lord Rayleigh.

Chemical Society, at 8.—The Action of Formaldehyde on Amines of the Naphthalene Series: G. T. Morgan.—On the Constitution of Oleic Acid and its Derivatives. Part I.: F. G. Edmed.

FRIDAY, May 20.

Royal United Service Institution, at 3.—Experiences with Röntgen Apparatus in Afghanistan: Surgeon-Major Beevor.

SATURDAY, May 21.

Royal Institution, at 3.—Biology of Spring: J. Arthur Thomson.

Geologists' Association (Paddington Station, G.W.R.). at 1.40.—Excursion to Penn and Coleshill. Director: W. P. D. Stebbing.

Essex Field Club (at Chingford), at 7.—On the Preparation of Marine Animals as Transparent Lantern Slides: Dr. H. C. Sorby, F.R.S.

MONDAY, May 23.

Society of Arts, at 8.—Electric Traction: Prof. Carus Wilson.

Royal Geographical Society, at 3.—Anniversary Meeting.

TUESDAY, May 24.

Society of Arts, at 8.—The Goldfields of British Columbia: W. Hamilton Merritt.

Linnean Society, at 3.—Anniversary Meeting.

Royal Victoria Hall, at 8.30.—Wood: Prof. H. Marshall Ward, F.R.S.

THURSDAY, May 26.

Royal Society, at 4.30.

Royal Institution, at 3.—Heat: Lord Rayleigh.

Institution of Electrical Engineers at 8.

FRIDAY, May 27.

Royal Institution, at 9.—Sir Stamford Raffles and the Malay States: Lieut.-General the Hon. Sir Andrew Clarke.

Physical Society, at 5.—A Simple Interference Method of Reducing Prismatic Spectra: Mr. Edser and Mr. Butler.—Some further Experiments on the Circulation of the Residual Gaseous Matter in Crookes' Tubes: Campbell Swinton.

SATURDAY, May 28.

Royal Institution, at 3.—The Biology of Spring: J. Arthur Thomson.

Geologists' Association (Liverpool Street Station, G.E.R.). at 11.45.—Long Excursion to Aldeburgh and Westleton. Directors: W. Whitaker, F.R.S., F. W. Harmer, and E. P. Ridley.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—Praktikum der Wissenschaftlichen Photographie: Dr. C. Kaiserling (Berlin, Schmidt).—Industrial Electricity: translated and adapted from the French of H. de Graffigny, and edited by A. G. Elliott (Whittaker).—Alternating Currents of Electricity: A. Still (Whittaker).—The Angora Goat: S. C. Cronwright Schreiner (Longmans).—Scientific Method in Biology: Dr. E. Blackwell (E. Stock).—Report of Investigations on the Life History of Salmon (Glasgow).—Supplement to the Bibliography of Algeria from the Earliest Times to 1895: Sir R. L. Playfair (Murray).—The Blood: how to examine and diagnose its Diseases: Dr. A. C. Coles (Churchill).—Applied Bacteriology: T. H. Pearmain and C. G. Moor, 2nd edition (Baillière).—Elementary Conics: Dr. W. H. Besant (Bell).—Examples in Analytical Conics for Beginners: W. M. Baker (Bell).—Five Years in Siam: H. Warington Smyth, 2 Vols. (Murray).—De Danske Barkbiller: E. A. Lovendal (Kjobenhavn, Det Schubotheske Forlag).

Pamphlets.—West Florida and its Relation to the Historical Cartography of the United States (Baltimore).—Die Jungfraubahn Elektrischer Betrieb und Bau: C. Wüst-Kunz and L. Thormann (Zürich, Fussli).—Second Annual Report of the New York Zoological Society (New York).—London County Council: Report of the Technical Education Board for the Year 1897-98 (King). Light and Fire Making; H. C. Mercer (Philadelphia, MacCalla).—Metric Equivalents of Imperial Weights and Measures and Thermometric Equivalents (*Pharmaceutical Journal* Office).—The Adulteration of Dairy Produce: R. H. Wallace (Edinburgh, Anderson).—Krōmscōp Colour Photography: F. Ives (Photochromoscope Syndicate).

Serials.—Engineering Magazine, May (222 Strand).—Journal of the Franklin Institute, May (Philadelphia).—American Journal of Science, May (New Haven).—Bulletin de la Société Impériale des Naturalistes de Moscou, 1897, No. 3 (Moscou).—Notes from the Leyden Museum, January (Leiden, Brill). Psychological Review, May (Macmillan).—Papers and Proceedings of the Royal Society of Tasmania for 1897 (Hobart).

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